Rhode Island Education Circulars

A COURSE OF STUDY
IN
FIRE PREVENTION

For use in the Public Schools of Rhode Island

Prescribed by the Commissioner of Education

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The commissioner of education is hereby empowered and directed to prescribe a course of study in fire prevention for use in the public schools of the state, dealing with the protection of lives and property against loss and damage as a result of preventable fires.

It shall be the duty of the state board of education, school superintendents, school committees and other executives and persons having control of public schools in cities and towns, to arrange for said course of study and require its use in all schools under its or their control and direction.

It shall be the duty of each teacher in any public school to devote not less than one hour, in each month during which such school is in session, to the instruction of the pupils thereof, in said course of fire prevention comprising the ways and means of preventing loss and damage of lives and property through preventable fires.

—From Public Laws of Rhode Island, Chapter 2025.

STATE OF RHODE ISLAND
PUBLIC EDUCATION SERVICE

FOREWORD.

The course of study in fire prevention and the suggestive lessons for the protection of life and property against fire contained in the following pages are prescribed by the Commissioner of Education in compliance with the requirements of law. The work of preparing the manual has been done with extensive research and painstaking care by the Assistant Commissioner of Education, Mr. Emerson L. Adams, to whom grateful acknowledgment is here given.

This is the third manual on fire prevention issued in recent years from the Commissioner's office for the use of public schools. In compliance with a law of 1912 requiring monthly fire drills in all schools, both public and private, a fire drill manual was prepared and distributed among the schools of the state. In 1919 the General Assembly made further provision for the "teaching of fire prevention in public schools" by authorizing the preparation and printing of a manual for such purpose. In pursuance of this legislation, a fire prevention manual, "Safeguarding the Home Against Fire," of ninety-one pages, was published, and an edition of 30,000 copies distributed to municipal school departments. To this manual frequent references are made in the following pages and its general use is implied in the prescribed course of study.

The action of the General Assembly, which created our public school system, together with dominant public opinion, clearly charges our public schools with the responsibility of teaching lessons and habits of safety to the public's children and youth. In performing this important duty superintendents and teachers, it is hoped, will find helpful material in this manual.

WALTER E. RANGER.
Commissioner of Education.

COURSES OF INSTRUCTION IN FIRE PREVENTION

I. *FIRE PREVENTION AND PROTECTION.*

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   e. Oil and oily substances—paint, chemicals, acids, chlorates, nitrates, peroxides.
3. *Explosive Substances.*
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   a. Use of concrete, gypsum and brick or tile in construction.
   b. Stopping flues in studding, especially in basement and attic.
   c. Providing doors with springs at tops or bottoms of stairs.
   d. Wire glass in transoms and other openings.
   e. Non-combustible roof coverings.
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III. *FIRE HAZARD IN SCHOOLS.*

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   c. Sprinkler system in the basement.
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   e. Reasonable provision for fire fighting apparatus.

IV. *FIRE HAZARD IN STORES AND PUBLIC BUILDINGS.*

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2. *Protection in Stores and Public Buildings.*
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   b. Absolute prohibition of smoking in danger zones.
   c. Especial care in kitchens, tailor shops, upholstering and packing departments.
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   e. Provision of fire walls.
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   g. Trained fire brigade and fire drills.
   h. Fire fighting equipment.
   i. Continuous supervision of all fire conditions by a competent man.

V. *FIRE HAZARD IN GARAGES.*

1. *Petroleum and Its Products.*

a. Proper storage and handling of gasoline.

2. *Static Electricity.*
   a. Produced by the friction of gasoline flowing through rubber hose or from a metal can.
   b. Hose usually equipped with copper wire running through it.
3. *Smoking.*
   a. "No smoking" rule enforced.
4. *Boiler Room.*
   a. Cut off by fire proof wall.
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   a. Avoided unless they can be arranged out of doors.
6. *Lighting.*
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   b. Wiring properly insulated.
   c. Conduit wiring preferred.

VI. *FOREST FIRES.*

1. *Fire Hazard.*
   a. Brush fires, camp fires, smokers.
   b. Railroads, lumbering.
2. *Preventing Forest Fires.*
   a. Lookouts in Rhode Island.
   b. Foresters and forest wardens.
   c. Precautions by the railroads.

SUGGESTED LESSONS.

I. *Fire Prevention and Protection.* Lessons 1 and 2.

Reports show a trifle under 1500 fires in the United States for every day in the year, more than a fire for every minute. Carelessness is the cause of three-fourths or four-fifths of all the fires in America. Ignorance with reference to conditions which are more than favorable for causing fire may account for a large part of the remaining one-fourth or one-fifth, with a small margin left for those fires that are deliberately planned. Wholly accidental fires are well nigh a negligible quantity. Education may easily prevent fires which occur through ignorance, but the great need is to get rid of the spirit of carelessness, which is the great factor to be eliminated. Again, much may be accomplished through education.

The city of Chicago, a short time ago, observed fire prevention week. Everybody entered into the spirit of the occasion. Prior to that time Chicago's daily fire loss had been $1800, but during that week it averaged $52 a day. It is quite safe to conclude that the care exercised by the citizens of the city was a significant factor in this decrease of fire waste.

Every man, woman and child should co-operate in community fire prevention. All should practice fire prevention every day, and it should not be necessary to set aside a day or a week for putting this into practice. Think of the possibility of blotting out eighty to ninety per cent. of our tremendous annual fire loss in property, the prevention of eight out of every ten deaths by fire, the elimination of the injuries caused by fire and the saving of a large amount of the expense for insurance. Comparatively few people realize that all the money paid for insurance comes directly from the pockets of the people and that all have to suffer for this carelessness.

Protection of Life and Property. Lessons 3 and 4.

Fire causes more than ten per cent. of all the accidental deaths in the United States. Some of these deaths occur in spectacular conflagrations like the Triangle Waist Company

and the Collinwood School fires, but by far the greater number occur by ones and twos in villages, towns and cities all over the country, from playing with matches, from handling of gasoline and common causes known to all. The only certain way to prevent this needless loss of life is preventing the fires. "In the past the efforts of fire departments and insurance companies have been devoted largely to improvements of methods and equipment for putting out fires, and improvement in the construction of buildings and their contents so they will not burn so readily. Little attention has been given to the prevention of fire by educating people to exercise care in the use of materials and better control of the properties of the materials that are constantly producing these fires. We are just beginning to find out that public accidents can be controlled, the same as industrial accidents. Each year as the number of automobiles has increased, the number of fatal accidents from the cause has increased, both in the country as a whole and in the larger cities. Yet the National Safety Council has met with considerable success in its efforts to eliminate accidents through an organized community effort to teach both the motorist and the pedestrian to be more careful."

The same methods are being applied to fire prevention. A great opportunity lies in prevention through education of the children in the school, the workmen in the factory, the child in the home and men and women everywhere.

Fire Losses in Rhode Island. Lessons 5 and 6.

The Census Bureau has issued a statement that the loss in Rhode Island by fire for the past five years was $9,624,381, or an average annual waste of almost two million dollars. These figures, though impressive, possess more meaning when it is known that a large part of this annual loss might be prevented by the proper exercise of care and thoughtfulness. A few comparisons may be interesting. The value of property destroyed by fire each year through carelessness is greater than the money used in two years by our State Board of Public Roads for the construction of new roads. This means that we could have more than twice

as much new road built each year with the money wasted through carelessness. The same amount of money would build every year nearly four hundred homes at a cost of $5000 each, capable of sheltering 2000 people.

The State of Rhode Island does not collect statistics of fire losses in the state. Fire losses in the cities, in nearly all cases, may be obtained from the chief of the fire department. The report of the National Board of Fire Underwriters for 1921 gives the following facts on fire losses in Rhode Island municipalities during 1920:

	Total Loss	No. of Fires to 1000 Pop.	Loss Per Capita
Central Falls	$12,880	3.28	$ .51
East Providence	50,050	5.04	2.27
Newport	165,420	5.28	5.17
Pawtucket	178,414	6.67	2.74
Providence	1,004,470	6.94	4.20
Woonsocket	76,735	6.43	1.74

Fire Losses in the United States. Lessons 7 and 8.

The National Board of Fire Underwriters reports that in 1920 eighty cities in the United States had a fire loss of more than $5.00 per capita, varying from $5.02 in Bay City, Michigan, to $91.31 in Sheboygan, Wisconsin. Every year from thirty to forty cities in the United States report fire losses of more than $5.00 per capita, while the average for the United States as a whole in 1920 was very nearly $3.00 per capita, or a total of $300,000,000. No other country except Canada reports so high a per capita loss. (See table of American Fire Losses for five years in "Safeguarding America Against Fire, January, 1921). Add to this amount $100,000,000 a year, the estimated expense of maintaining fire departments, and $141,000,000 paid to insurance companies which they do not pay back for losses, and we have nearly a quarter of a billion spent for fire protection in the United States alone. We might add something for the losses on property destroyed by fire which is not insured. Who pays for this loss? Surely not the insurance companies. Every adult, either as rent, taxes, or as a part of

the price of the articles he buys, helps to pay the cost of insurance.

All forms of waste should be avoided. That of fire is one of the greatest and the least excusable. The annual fire loss, including the cost of protection, would support the public-school system of the United States for a year.

In addition to the loss of property, reliable statistics give the loss of life as nearly 15,000 every year. There are no available means of estimating the loss through the interruption of business, yet it is very great.

In the year 1913, America's per capita record was four times as great as that of France, and nearly twenty times as great as that of Holland. Vienna and Chicago are cities of about the same size. Vienna's fire losses for 1913 were $303,200; Chicago's losses for that year were $5,513,237, or more than eighteen times as great. In the same year New York city's losses were about one and one-half times as great as those of London. London was then the larger city. Why this difference? Of course there are more wooden buildings in America than Europe and fire hazards are therefore increased, but this great difference cannot be accounted for wholly on that basis. The best authorities say that carelessness and indifference to the danger are the causes of nearly eighty per cent. of the fires in the United States.

If fires in our country occurred at average periods of time and the losses were distributed evenly throughout the year, then every second $10.00 in property is destroyed; every minute a new fire starts somewhere in the United States, every hour two lives are lost and seven persons are injured through fire, every day enough property value is destroyed by fire to feed and clothe a city of 50,000 people for ten days, every week the fire loss is enough to build 100 miles of good macadam road.

Mr. Bugbee of the National Board of Fire Underwriters is responsible for the statement that over a billion dollars worth of property was destroyed by fire during the past two years, and thirty thousand persons were burned to death during the same period.

Fire Losses in Other Countries. Lessons 9 and 10.

Fire losses in other countries reported in the annual proceedings of the National Board of Fire Underwriters are as follows:

	Per Capita		Per Capita
In Belgium	$1.02	Japan	$ .51
Russia	.97	Sweden	.42
France	.74	Austria	.32
England	.64	Germany	.28
Norway	.55	Netherlands	.11
Italy	.53		

Fire prevention authorities contend that by following the practices of the foreign countries more closely, we could reduce fire waste one-half and the cost of insurance in the same proportion.

By law in France every person is responsible and liable for any acts of his by which any other person has or may have sustained any loss, damage or injury, provided it is proved that such acts were the result of carelessness or negligence. This means that any damage by fire done to neighboring property caused through gross negligence or fault must be made good by the person at fault.

In Germany the owner or tenant is held responsible; or even the previous owner or the contractor who built the building—the contractor if the fault lay in the construction, or the previous owner if when he sold the building he was aware of the fault and failed to inform the present owner, or the present owner if he was aware of the defect and failed to remedy it. Not only is the insurance forfeited, but the expense of extinguishing the fire and an extra penalty for neglect must be paid if such carelessness can be proved.

Why not make the laws applying to injuries caused through carelessness of cities or corporations apply in the case of fires caused by the carelessness of individual owners of property?

The Supreme Court of Michigan has decided that "One through whose negligence fire is caused in his building,

which spreads to his neighbor's building, is liable for damages."

A few more actions for damages due to fires caused by gross negligence or violations of local ordinances or state law would impress upon all the fact that "each one is his brother's keeper."

If your careless neighbor knowingly harbors a defective chimney, a rubbish-filled basement, a trash-laden attic, defective electric wiring, or stoves installed so as to endanger woodwork, or is careless in the use of gasoline or the storage of other oils, oily waste and rags, then he is careless of the safety of his own property and family, and of your property and family, and the lives of firemen. Such a man needs discipline, not sympathy in case he has a fire. He must be taught the lesson that since the days of Robinson Crusoe "No man liveth to himself alone," and each owes a duty to the other.

The public press is awakening to the public responsibility for fires.

"Most of the fires are due to somebody's carelessness, stupidity or penuriousness. For every such fire somebody is responsible, and in a properly ordered community, for every such fire somebody should pay a penalty proportioned to the trouble, loss and danger imposed by it on his neighbors and the general public."—*New York Times.*

Inflammable Material. Lessons 11 and 12.

"The careless smoker is probably the most dangerous man in a community. Especially is this true of the cigarette smoker, who is continually lighting matches and carelessly throwing them in all directions. Usually he is a man who is somewhat nervous and pays little attention to his surroundings when he lights a match; less, when he disposes of it. He is liable to light a match close to men handling gasoline; especially is this true when he has the tank of his car filled at a filling station. Not all smokers should be criticised, but many are extremely careless with matches, cigar and cigarette stubs. Sixteen million dollars worth of

property, not to mention the grave loss of life, were burned up in this way last year."

It is an interesting fact that the United States with approximately one-tenth of the population of the world, uses more matches than the other nine-tenths. This in some measure may explain why our fire losses are greater than any other nation's except Canada.

The use of a lighted match to ascertain the contents of a gasoline can or other container of inflammable liquid is always hazardous. "The pitcher went to the well ninety-nine times, but broke on the one hundredth trip." It is never safe to take a chance.

Matches. "Safeguarding the Home Against Fire." Try to secure the May, 1921, issue of "Safeguarding America Against Fire," National Board of Fire Underwriters, 76 Williams Street, New York City.

The sunlight shining through a glass globe, a fish bowl, or a lense often produces heat enough to ignite paper or other inflammable material on which it falls. Find the reason.

The flame from a candle, gas light, bonfires, torches, etc., quickly sets fire to clothes, papers or any easily burning material.

Hot substances such as iron, ashes, cigarette and cigar stubs and heaters of all kinds, in contact with dry substances, cause fire. Many fires are caused every year by the electric flat when the current has been accidentally left on. Great care should be exercised in handling hot substances, as inflammable material when heated to certain temperatures ignites.

Oil, oily substances and clothes saturated with oil or paint when slightly heated, especially in a dry place, readily take fire. How would you take care of these?

Chemicals of many kinds—acids, chlorates, nitrates and peroxides—often cause fire. Vegetable and animal oils, coal, charcoal, lampblack, organic and metallic dust ignite spontaneously at certain temperatures. What is spontaneous combustion?

Explosive Substances. Lesson 13.

Kerosene is much like gasoline except that at ordinary temperature it does not form a gas rapidly enough to be dangerous. On being heated it readily becomes a gas that is highly explosive when mixed with air. It burns freely and gives a good light. Its use in kindling fires is very dangerous.

Illuminating gas when mixed with air in certain proportions is highly explosive. A leak in the piping or about the stove allows gas to escape and mix with the air, then a spark or a light causes an explosion. The presence of this gas is readily detected by the odor, and a light should never be allowed in the room until a window has been opened and the gas removed. This gas is poisonous and will cause death if inhaled in quantity.

Gasoline, Naphtha, Benzine. Lesson 14.

Gasoline, naphtha and benzine are derived from the same source and are alike in nature, although differing slightly in volatility. All these at ordinary temperatures give off a gas which, when mixed with air and ignited by a flame or spark, explodes and causes fire. "They may be defined as a petroleum product more powerful than dynamite, as sure to explode as nitroglycerine, as deadly as cyanide of potassium, as innocent looking as water, never fool proof or danger free; to be stored underground and used out of doors." Keep fire, lights, matches and lighted cigars away from them. Articles cleaned with them should be thoroughly aired.

Dust explosions occur in grain mills, wood working shops, cork factories and in metal scrap and iron filings, especially if oil is present. In the presence of heat the rapid oxidation of fine particles of the material suspended in the air produces spontaneous combustion and the fire spreads with great rapidity. A spark or flame often starts a fire when conditions are not favorable for spontaneous combustion. A well regulated blower system to take care of this dust as fast as it is made is the most effective device for

protection. These fires are extra hazardous, since the entire room or plant is almost instantly enveloped in flames, and are usually accompanied by loss of life if employes are present.

Acetylene Gas. Lesson 15.

Acetylene gas, generated from the action of calcium carbide and water, is used for lighting purposes. It is colorless and non-poisonous. It is cheaply prepared, and no other light so successfully penetrates fog, hence its use on bicycles, railroad engines and automobiles. It burns with a clear, steady light, and is much used for lighting buildings, but its use is very dangerous as it is highly explosive when mixed with air. Therefore, it is usually manufactured outside of the building by allowing just enough water to come in contact with the carbide to supply the gas needed for the lamps

Pyroxylin Plastic. Lesson 16.

"Safeguarding the Home Against Fire." Page 74.

Lightning. Lesson 17.

The positive electricity of the clouds and the negative electricity of the earth attract each other. An equalizing current passes between them. If the resistance of the air is sufficiently great, this current accumulates and when it becomes strong enough to overcome the resistance, the two currents leap together and cause an explosion which very often produces fire. The problem then is to offer a good conductor for this current. Pure copper wire weighing not less than three ounces to the foot, or galvanized iron at four and one-half ounces to the foot, are good conductors. This wire, properly installed on buildings, is an effective protection against the fire loss from lightning. Few buildings are struck by lightning where rods are installed, or if so struck the current passes over the rods to the ground. It is declared that "the points on lightning rods enable the electricity withdrawn from the ground to flow into and neutralize the positive electricity of the cloud." This, according to investigators, is the manner in which lightning conduct-

ors come most frequently into play. There is a diversity of opinion relative to the comparative immunity to lightning losses enjoyed by unrodded city buildings, but the fact is that most lightning damage is suffered by country property.

Preventing Outbreak of Fire. Lessons 18 and 19.

It is a generally accepted fact that the frequently used term "fire proof" is a misnomer. There is no construction that is fire proof as applied to buildings in common use throughout the country. The best that can be done is to make all construction as fire resisting as possible. This is the real problem for all engaged in the production of materials for building purposes and those using the same.

A watchman should make frequent trips to all parts of the building housing large quanties of valuable property, especially if this property is by nature extra hazardous or where a large number of persons are employed during the working hours.

Careful supervision of workers and the handling of the products involved in the business should be added to insure protection during working hours. Too often the supervisory staff give attention to the problems of quantity production, and the possible destruction of materials and products by fire is remote from their thoughts. A little more care and foresight would often save much annoyance and loss of both material and time.

Again, only careful inspection of every part of buildings and expert supervision of those engaged in the enterprise insure a fair degree of safety.

Preventing the Serious Spread of Fire. Lessons 20 and 21.

Prompt detecting and extinguishing of fire is so well treated in "Safeguarding the Home Against Fire," that it is best to look the matter up in that manual.

It is generally admitted that more fires are extinguished by pails of water than by all other means combined. This is because every one understands and instinctively uses the pail and it can almost always be used when the fire is starting. The difficulty experienced with the use of fire

pails for fire protection is the fact that they are often used for domestic purposes, they are unsightly, they become foul, and when the water is thrown there is none for further work until they are refilled. The difficulty of using them effectively on ceilings and partitions is very great. Fouling can be retarded by the use of lime. The chief advantage of the fire pail is the small expense of maintenance.

Two kinds of chemical fire extinguishers are in common use, what is known as the soda acid and the dry powder extinguisher. The soda acid extinguisher consists of a strong copper tank filled with a solution of soda bicarbonate, with a bottle of sulphuric acid so arranged that it is broken or discharged into the soda solution when the tank is inverted. Chemical action forms a quantity of gas, which produces high pressure to force the same through the nozzle connected with the tank. The carbon dioxide gas is an effective gas blanket and shuts off the air which is essential for the further spread of fire. This is probably the best off-hand apparatus for inside work. It is easily maintained and very effective in the hands of those who are trained to use it. Its chief disadvantage is its liability to freeze.

The other type of chemical extinguisher is the carbon tetra chloride extinguisher. It consists of a dry powder, mainly tetra chloride in a metal tube, and is especially effective in electric and oil fires. Its advantage consists in its compactness and non-freezing properties. It is not so effective as the soda acid extinguisher for general protection.

In large buildings, especially if used for manufacturing or business purposes, special devices, as fire doors and fire walls, should be added to the usual fire resisting construction. In a recent Chicago fire several buildings involved were considered fire proof, and might have proved such if metal shutters had been provided for the windows. The fire from adjoining buildings entered through the windows and stripped the buildings of everything that could be burned. Equipped with the protection suggested above, a building may be divided into units; and all save one unit may be saved.

Turning in the alarm as treated in "Safeguarding the Home Against Fire," and training and drill in its use may be given until all understand the system used in the locality.

The necessity of having trained men to handle fire apparatus seems self evident, and yet many plants with private fire protection systems seriously neglect this important feature. The value of the well trained fire brigade, with men drilled to do specific things in the case of fire, cannot be overestimated, and time for drills should be taken on company time, or men so engaged might draw a bonus for time spent in this work. Rapidity of execution and effectiveness of effort cannot be expected from men without training, and often quite as much harm as good results from lack of knowledge of essentials in the excitement and confusion resulting from a fire. Every man at his station and every man carrying on can result only in the case of trained men. The management should take a lively interest in this matter and give the needed encouragement to establish an efficient organization. For the safety of the property, as well as for the protection of the employees, exit drills for the workers should be conducted at regular intervals to avoid the confusion which usually follows the ringing of the fire gongs.

II. *Fire Hazards in Dwellings.* Lessons 22 and 23.

More than half of all fires reported occur in the homes, and most deaths from fire result from carelessness at home. With the approach of cold weather and the lighting of fires for heating, dwelling house fires increase. One state reports that more than one-fourth of its loss results from fires caused by heating plants. Failure to examine the apparatus and to have it cleaned and repaired accounts for many of these fires. Overheating and use of kerosene oil in lighting fires accounts for more. Trash and rubbish, or oily mops and rags, in attic, closet or cellar, are a frequent cause of fire. Hot ashes in wooden receptacles or against combustible partitions also cause fires. The fumes from gasoline or benzine, and the gas used for lighting or heating when mixed with air in the right quantities produce a

powerful explosive, which is instantly set off by a flame or spark. Leakage of gas is due to defective pipe connections, defective keys and valves, failure to turn the key completely, turning the key some time before lighting the gas, and the use of unreliable fixtures. No flame can be safely used to locate a leak. If the leak cannot be easily located, turn off the gas, open the windows and notify the gas company by telephone. Explosions of gas stoves are often due to carelessly opening two valves and lighting only one burner. "Safeguarding the Home Against Fire."

The average dwelling, as usually designed, is the most combustible of all buildings. Wooden walls and air spaces in these walls, wood floors and finish of a highly combustible character, make these buildings particularly adapted to rapid destruction by fire. With the possibility of rapid fire spread and life jeopardy, especially at night, and the fact that fire prevention in the home is to a very large degree encumbent upon the members of the household, it is highly important that all in the household should contribute their share in care and protection of the home against fire.

It should be clear to all that a sound stove, furnace or boiler, sound smoke pipes and a perfect chimney are essential to confine fire. These should be arranged a safe distance from all wooden partitions or joists. Let the stove be placed on an incombustible base and the whole equipment carefully inspected each year. "Safeguarding the Home Against Fire."

In one state, of 2161 fires in one year, 1005 were in dwellings, with a loss of $707,784. In another state, 6643 out of a total of 14,052 fires occurred in dwellings, in one year, with property loss of $3,926,815; and the next to the largest number of fires was 1467, in apartment houses, flats and rooming houses. Of a total of 2810 fires in another state, 1407 were fires in dwellings, entailing a loss of $977,221.

More lives are lost in fires in dwellings, apartment houses and hotels every year than in all the fires in factories, schools and theatres in the average decade. Can you give the reason for this? Why were 125 houses burned for

every month last year in one of our states, when there is such a shortage of houses? The common causes of fires are simple and all can understand and correct them.

Fire Protection in Dwellings. Lessons 24 and 25.

Matches should be kept in metal containers. Use the safety match when possible.

Keep ashes in metal cans.

Maintain cleanliness in every part of the house and cellar.

Burn oily cloths or keep them in metal containers.

Place furnaces or stoves at a safe distance from wall. Inspect all pipes regularly to see that they are safe for use, and see that they are located at a proper distance from wooden walls.

Gasoline and kerosene should not be used to kindle fires, or for cleaning or any purpose in a room where there is an open flame.

An open flame should always be protected, lest curtains or light material be blown across the flame and ignited.

Neglect to shut off the current from electrical appliances has caused many fires, and the utmost care should be exercised in their use.

Old wooden shingles on the roof are loose and present cracks where sparks from the chimney may lodge and start fires. Fire proof roofing is required in the larger cities and is better for all buildings.

Chimneys should be built of a double row of bricks, or if single, should be well plastered on the inside or have tile lining. The mortar in the chimney often cracks and leaves space for sparks to come out and set fire to the surrounding wood. Regular inspection once a year and remedying of defects will prevent many fires.

To test a chimney, cover the top and burn papers or light material in stove or clean out and watch for any smoke escaping through cracks.

Many fires are caused by placing cloth or wood in the oven to dry.

Suggestions for Home Protection.

Stop all flues in studding, especially in the basement and attic.

Replace wooden shingles with asphalt or tile roof.

Keep a pail of water in the basement, attic and storeroom. Add salt when there is danger of freezing, and lime if troubled with fouling.

Provide a 2½ gallon capacity soda acid extinguisher, or the smaller size if this is too heavy.

Have a bag of dry sand handy to use for grease fires—or flour may be used instead.

Install automatic sprinklers in the basement when water pressure can be obtained.

Use safety matches and keep them where children cannot get them.

Burned matches should be placed in the stove or kept in metal containers.

Smokers should extinguish fire or sparks from matches, stubs or pipe heel.

Test the chimney once a year or examine it carefully where the test is impractical.

Examine heater and pipe for cracks before starting the fire in the fall.

Never dry kindling about the hot stove.

Keep ashes in metal containers.

Use only stove polishes that are non-inflammable.

Fill lamps only in daylight.

Keep a woolen blanket where it may be secured immediately for rolling when clothing catches fire.

Gasoline or kerosene should be kept out of doors.

Use flour to extinguish oil or gasoline fires when sand is not available.

Destroy oily rags and clear rubbish from every part of the building.

In hunting in a dark closet use electric light only.

Never build bonfires except in places absolutely safe, and keep children at a safe distance.

In a burning building keep near the floor if there is much smoke.

Know where the nearest fire alarm box is and how to turn in the alarm.

Do not use gasoline for cleaning where there is an open flame, nor put the cleaned clothes near the fire until the gasoline has evaporated.

III. *Fire Hazards in Schools.* Lessons 28 and 29.

The schoolhouse fire, like other fires, is much too frequent in America. Statistics show that there is less danger of loss of life in school than in other fires, notwithstanding the fact that these buildings are occupied by young children who are not as capable of exercising care and good judgment as older people. Two reasons may be given for this: the fire drill system maintained and practiced, and the fact that all parts of the building are occupied when the children are in the building, so that fires do not get much start before they are discovered. Fire dangers in schools may be eliminated to a large extent by proper care in schoolhouse keeping and better methods of construction.

It is a well established fact that nearly all schoolhouse fires have their origin in the basement, attic, supply closet, waste basket, or chemical laboratories. These places should, therefore, have special care in measures taken to insure safety in these buildings. Ashes from the heating plant may be safely retained for a few days in metal cans, but should be removed frequently. All waste paper that accumulates during the day is usually removed to the basement and should be pressed immediately and removed from the building or be disposed of by burning. It is not safe to retain loose paper in bins or barrels.

Fire Protection in Schools. Lessons 30 and 31.

All vertical openings and stairways should be properly protected and adequate exits maintained. Also all doors and gates should be kept unlocked when the building is in use. Wide aisles in the rooms, broad halls, and wide stairs are of the greatest importance. Room doors should swing

in, that the children may be under control of the teacher until such time as they may safely enter the corridors. Outside doors, equipped with panic bolts, should swing outward.

Fire drills are required by law. They should be carefully planned, and executed in perfect order and discipline. Fire escapes should be provided on all buildings of more than one floor. Fire proof construction is preferable, and should be required in all buildings of two or more floors.

Every building, where water pressure is sufficient, should be equipped with a sprinkler system in the basement, and one and one-half gallon acid-soda extinguishers of the tip-over type placed at convenient distances on each floor. The teachers and a few of the pupils may be instructed in their use.

While school buildings should be of fire proof construction whenever funds permit, the safety of the building depends quite as much upon its general plan and the location of the stairways, corridors and exits. The stairways should be so located as to reduce horizontal distance from rooms to exit, preferably at the ends or corners of the structure, and should terminate at the yard level.

The heating plant should be located at a safe distance from stairs, and space near stairs should never be used for storage.

IV. *Fire Hazards in Stores and Public Buildings.* Lessons 32 and 33.

In the larger stores and public buildings an engineer or fireman is employed, who keeps the fire, attends to the repairs of the heater and cleans the engine room. Under these conditions there is a minimum amount of danger and fires seldom originate from the heating apparatus. In smaller establishments the heating apparatus is visited at infrequent intervals, little time is devoted to its care and few repairs are made. These conditions make it a real hazard, and frequent inspections are necessary for the safety of the building in which it is located, and for the protection of surrounding property.

Ashes should not be allowed to accumulate and should be kept in a metal container. A careful inspection of the wiring is a necessity for proper protection against fire. A short circuit or improper insulation often causes fire.

Oils and oily material are present in stores, factories and nearly all public buildings, either as a part of stock in trade, or for use in cleaning or repairing, and these become a fire menace when exposed to heat and surrounded by certain gases.

Probably the greatest single danger in business establishments and other public institutions is from the rubbish, sweepings and refuse constantly accumulating. Any inflammable substance brought into contact with these materials is almost sure to cause fire. A little packing material left in a box, a little paper in some other place, or the accumulation of dust and lint only needs a lighted match, a cigarette stub, or any hot substance to cause a conflagration. Even spontaneous combustion may take place under favorable conditions.

Fire Protection in Stores and Public Buildings. Lesson 34.

The prompt disposal of all rubbish, sweepings, paper and boxes that accumulate is of the greatest importance as a preventive measure. The packing room should be separated by a fire proof partition from the other rooms and no inflammable material or smoking should be allowed in this room. No smoking should be allowed in kitchens, tailor shops, upholstery departments or where combustible material is stored.

In all large establishments fire walls are essential to isolate departments in case of fire. For safety, a fire alarm system is usually installed, reaching every department. Fire fighting apparatus should be arranged on every floor. This may consist of chemical fire extinguishers, fire pails filled with water, or a stand pipe equipped with hose.

With the ringing of the fire alarm, automatic closing of vertical openings and light wells should be arranged to stop the rush of fire from floor to floor. Where possible there should be horizontal openings for the exit of employees.

Fire drills for the exit of employees, a trained fire brigade to use the apparatus for fighting fire, and a competent man in charge of all fire conditions are important in every large organization.

V. *Fire Hazards in Garages.* Lessons 35, 36 and 37.

The hazard of gasoline has been more largely responsible for fires in garages than any other single cause.

Forty-eight per cent. of the fires recorded by the National Fire Protection Association originated from gasoline outside of the car, and nineteen per cent. from the car itself.

The gasoline used about the garages is often ignited from matches, forges and furnaces, torches, heaters, backfiring, static electricity, acetylene light in cars, burning out of carbon, and spontaneous combustion of waste.

The only safe method, then, is to keep the gasoline out of the garage, and exercise the greatest vigilance in the care and use of any of the above appliances.

Fire Protection in the Garage.

Hot water or steam is the safest method of heating.

Pits or depressions in the floor should never be allowed in the garage, as the gas from gasoline is heavier than air, and ventilation does not remove it from the lower places. Repairs requiring fire heat should be done in a separate room devoted to that purpose.

Gasoline should not be used for cleaning the parts of a car. Kerosene is recommended and is safer.

Lighting should be by electricity, and care should be taken to place switches and fuses where no gas can get at them.

The gas-arc located ten feet from the floor has been used successfully, but must not be installed except by permission of underwriters.

Fire resisting construction is preferable where possible, and under certain conditions is required by building codes.

The soda-acid extinguisher, sand pails and the tetrachloride extinguishers should be supplied.

The "No Smoking" notice should be posted in public garages and the proprietor should insist upon its observance by employees and patrons.

VI. *Forest Fires.* Lesson 38.

Every forest fire is destructive. Even if it does not kill the larger trees it will kill the seedlings and saplings and leave the surface barren of the leaf mold which has accumulated from year to year from the falling leaves and dying vegetation. This humus absorbs water, produces plant food and keeps the ground moist and porous. When destroyed by fire, the moisture evaporates, the surface hardens and rain falling runs off to the streams and ceases to supply the water needed constantly by the trees to insure proper growth.

During five years, 1916-1920 inclusive, the record of property loss in the United States due to forest fires was $85,715,747, or nearly $47,000 per day, and more than 56,000 acres were burned.

If a forest is destroyed it takes from thirty to one hundred years to replace it. Without trees we would have no lumber for buildings, for furniture, for ships and for the many needs that it now supplies.

Fire Hazard in Forests. Lesson 39.

Chief among the causes of forest fires are railroad locomotives. Next comes the careless burning of brush and trash by farmers and others; then campers and pleasure seekers with their camp fires, and carelessness with matches and smoking, as well as those who set fires in fields and wood without considering the damage they are doing. Hunters, fishermen and woods workers of all kinds smoke in the forest and are not always careful to make sure that they do not start a fire.

Preventing Forest Fires. Lesson 40.

A bonfire or camp fire should never be left until you are sure every spark of fire has been put out. When a fire has burned low and is apparently "dead," a strong breeze

will often stir the slumbering coals to redness and set fire to grass and leaves.

Twenty-eight states, including Rhode Island, have established state systems for protecting their forests against fires, in cooperation with the federal government. Rhode Island maintains two observation stations located on the summits of high hills. Pine Hill, 543 feet above the sea level in the town of Exeter, has a 50 foot tower. Chop Mist, 730 feet high in Scituate, has a 40 foot tower. These stations are provided with telephones and field glasses and are also equipped with orientated topographical maps and range finders, which enable them by triangulation to locate fires from five to ten miles away. A constant watch is maintained from early spring to late fall, whenever the forest is dry. The federal government inspects these lookouts regularly and helps to maintain them. Does Rhode Island need more lookouts?

Railroads employ men when forests are very dry to follow trains to watch for and put out fires started by sparks from the engines. The new engines are equipped with spark arresters, that prevent the emission of live fire to be blown into the grass along the route.

Who is the state forester and what are the duties of the forest wardens? Has air patrol been added to the state equipment?

Never pass, in forest or field, even the smallest fire unnoticed. Put it out yourself, or before you leave, see that the fire warden, the owner of the property, or some responsible resident takes measures to extinguish it. Fire travels with the wind always. Try to stop its direct advance first. Sand or soil will smother it, beating may kill it, but water is better. In some cases it will be necessary to dig a trench across its path.

From the Annual Report of Fire Marshal of Illinois—1920.

Classification of Property Burned, Number of Fires and the Fire Loss According to Property Destroyed from July 1, 1919, to June 30, 1920.

	Class of Property	No.	Damage
1.	Apartment houses, flats and rooming houses....	1,467	$426,163
2.	Amphitheatres, grand stands, etc.....	4	20,300

3.	Bakeries	48	36,845
4.	Barber shops	74	16,760
5.	Barns and stables (not liveries)	734	1,021,439
6.	Churches	98	180,079
7.	Depots, stations, waiting rooms, etc	46	45,950
8.	Dry cleaning establishments	25	11,198
9.	Dry houses, kilns, rooms, etc	5	2,270
10.	Dwellings	6,648	3,926,815
11.	Elevators and grain warehouses	16	186,473
12.	Factories	551	3,709,115
13.	Foundries	47	33,542
14.	Garages	386	660,812
15.	Granaries	14	31,843
16.	Green houses	3	2,210
17.	Halls, (lodge), (club), (dance), (public), etc	84	480,150
18.	Hotels and boarding houses	114	123,873
19.	Hospitals	14	46,035
20.	Ice houses	18	62,290
21.	Jails	1	10
22.	Laundries	32	54,660
23.	Liveries	5	30,155
24.	Mills (flour)	4	137,000
25.	Mills (saw and planing)	6	14,715
26.	Office buildings	82	176,097
27.	Oil houses	15	106,427
28.	Photo studios	10	2,730
29.	Power houses, pump houses and engine houses	43	54,242
30.	Restaurants	118	44,342
31.	Saloons	53	21,900
32.	Sheds	837	353,209
33.	Smoke houses	55	8,847
34.	Silos	4	1,650
35.	Stores	1,034	1,473,380
36.	Shops, (carpenter, blacksmith, etc.)	219	191,741
37.	Schools, (colleges, seminaries, etc.)	78	155,025
38.	Theatres and motion picture houses	24	63,978
39.	Warehouses	149	831,814
40.	Miscellaneous	124	296,410
	FIRES OTHER THAN BUILDINGS.		
1.	Automobiles	454	70,489
2.	Boats	13	18,100
3.	Bridges	7	1,720
4.	Cars, (railway), (electric), etc	144	1,071,573
5.	Docks, (coal), etc	...	.....
6.	Fences	28	352
7.	Grain and hay	58	16,285
8.	Junk yards	13	22,025

9.	Lumber yards	19	11,660
10.	Tanks, (water), etc	17	295,365
11.	Tents	4	945
12.	Threshing outfits	...	.....
13.	Trestles	1	5
14.	Wagons	5	1,230
		14,052	$16,552,248

From the Annual Report of Fire Marshall of Illinois—1920.

Classification of Causes, Number of Fires and the Loss Therefrom According to Causes, from July 1, 1919, to June 30, 1920.

	Cause	No.	Damage
1.	Chimneys, flues, cupolas and stacks, overheated or defective	1,113	$926,153
2.	Conflagrations	17	21,475
3.	Electricity (except electric irons and similar devices)	513	1,850,336
4.	Explosions	77	432,067
5.	Exposure	656	459,755
6.	Fireworks, fire crackers, balloons, etc	50	2,895
7.	Friction, sparks occasioned by running machinery	39	38,710
8.	Gas—natural and artificial	314	146,290
9.	Hot ashes and coals, open fires	427	118,804
10.	Hot grease, oil, tar, wax, asphalt (ignition of)	160	88,622
11.	Hot irons, including electric devices	88	25,743
12.	Incendiarism	214	1,220,515
13.	Lightning—buildings rodded	1	10
14.	Lightning—buildings not rodded	261	808,044
15.	Matches, smoking	1,514	543,931
16.	Miscellaneous—cause known, but not classified (for unknown see No. 27)	61	30,101
18.	Open lights	188	212,292
19.	Petroleum and its products	623	572,289
20.	Rubbish and litter	488	93,847
21.	Sparks—arising from combustion (other than, 22)	255	271,716
22.	Sparks—on roofs	3,250	1,140,726
23.	Spontaneous combustion	345	608,565
24.	Steam and hot water pipes	85	32,188
25.	Stoves, furnaces, boilers and their pipes	1,041	849,348
26.	Unknown	1,510	3,715,346
27.	Unknown origin, but investigation important	762	2,342,490
		14,052	$16,552,248

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